Key

Name _____ Date _____

LESSON 4.4

Study Guide

For use with pages 234–242

LESSON 4.4

GOAL **Find the slope of a line and interpret slope as a rate of change.**

Vocabulary

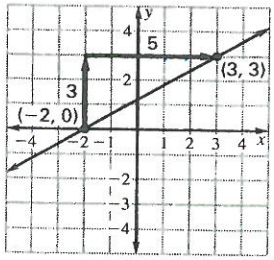
The **slope** of a nonvertical line is the ratio of the vertical change (the *rise*) to the horizontal change (the *run*) between any two points on a line.

A **rate of change** compares a change in one quantity to a change in another quantity.

EXAMPLE 1 **Find a positive slope**

Always Read graphs from Left to Right!

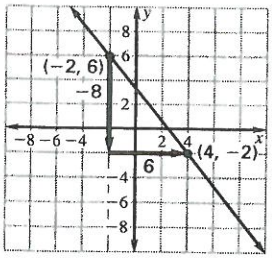
Find the slope of the line shown.



$$\frac{\text{Rise}}{\text{Run}} = \frac{\uparrow 3}{\rightarrow 5} = \boxed{\frac{3}{5}}$$

EXAMPLE 2 **Find a negative slope**

Find the slope of the line shown.



The line falls from left to right. The slope is negative.

$$\frac{\text{Rise}}{\text{Run}} = \frac{\downarrow 8}{\rightarrow 6} = \frac{-8}{6} = \boxed{\frac{-4}{3}}$$

Slope Formula

$$\frac{y_2 - y_1}{x_2 - x_1}$$

Exercises for Examples 1 and 2

Find the slope of the line that passes through the points.

1. (−4, −1) and (5, 9)

$x_1\ y_1\ \ x_2\ y_2$

$$\frac{9-(-1)}{5-(-4)} = \boxed{\frac{10}{9}}$$

2. (−2, 5) and (−7, 8)

$x_1\ y_1\ \ x_2\ y_2$

$$\frac{8-5}{-7--2} = \frac{8-5}{-7+2} = \frac{3}{-5} = \boxed{\frac{-3}{5}}$$

3. Find the missing value.

$(0, y), (-2, 1)$; $m = -8$

$x_1\ y_1\ \ x_2\ y_2$

$$\frac{1-y}{-2-0} = \frac{1-y}{-2} = -8$$

Solve

$$(-2)\frac{1-y}{-2} = -8(-2)$$

$$1-y = 16$$

$$-1 \quad -1$$

$$-y = 15$$

$y = -15$

Check

$$\frac{1--15}{-2-0} = \frac{16}{-2}$$

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LESSON 4.4

LESSON 4.4 **Study Guide** *continued*
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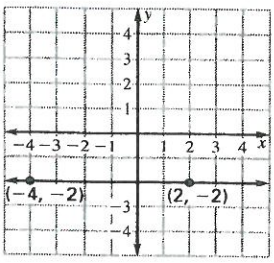
EXAMPLE 3 Find the slope of a horizontal line

Find the slope of the line shown.

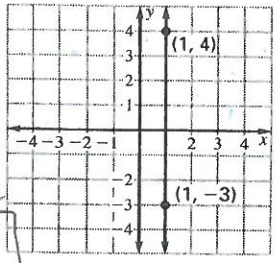


(-4, -2) (2, -2)
x_1 y_1 x_2 y_2

$\frac{-2-(-2)}{2--4} = \frac{0}{6} =$ 0 Slope

EXAMPLE 4 Find the slope of a vertical line

Find the slope of the line shown.



(1, 4) (1, -3)
x_1 y_1 x_2 y_2

$\frac{-3-4}{1-1} = \frac{-7}{0}$ undefined
No Slope

EXAMPLE 5 Find a rate of change

Water loss The table shows the amount of water evaporating from a swimming pool on a hot day. Find the rate of change in gallons with respect to time.

Time (hours)	2	6	10
Gallons evaporated	4.5	13.5	22.5

x
y

Solution

Rate of change $= \frac{\text{change in gallons}}{\text{change in time}} =$ $\frac{13.5-4.5}{6-2} =$ $\frac{9}{4}$ gal./hour

$\frac{\text{change in } y}{\text{change in } x}$

Exercises for Examples 3, 4, and 5

Find the slope of the line that passes through the points.

4. (−8, 0) and (3, 0) 0 Slope

5. (5, −8) and (5, 4) No Slope

6. Find the rate of change in calories burned with respect to time.

Time (minutes)	40	60	80
Calories burned	500	750	1000

$\frac{750-500}{60-40} = \frac{250}{20} =$ $\frac{25}{2}$ cal/min